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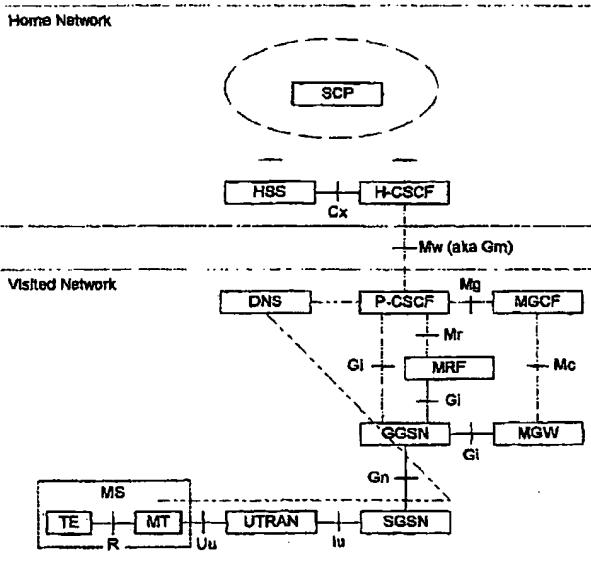
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR ADDRESS RESOLUTION TO FIND CALL CONTROL FUNCTION INSTANCES



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(57) Abstract: A mobile station can be provided with necessary information of call state control functions, especially in case of roaming without expenditure when using a proxy call state control function (P-CSCF) acting as a border element and controlling local services and occasionally necessary resources within this network. According to a preferred embodiment the selected call state control function (CSCF) acts as a redirect server and redirects a session initiation protocol (SIP) request to another, especially an (CSCF).

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**Description:**

Method for address resolution to find call control function instances

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Present invention relates to an address resolution procedure to find various CSCF instances in an IP controlled network according to pre-characterising part of claim 1.

10 For Universal Mobile Telecommunication System (UMTS) there is known a routing model introduced in Third Generation Partnership Project (3GPP) Standard "TS 23.228". In each network exists a Proxy Call State Control Function (P-CSCF) which is the first contact point within the IM CN (IP Multimedia Core Network) subsystem.

When a mobile station or mobile host visits a foreign network then IP-Address (IP: Internet-Protocol), Standard-Gateway and Domain Name Server (DNS) are assigned at bearer level. Their 20 values are taken from the address space of the visited network and assigned during Packet Data Protocol (PDP) context activation using Dynamic Host Configuration Protocol (DHCP), for example. All IP addresses are globally visible i.e. IP addresses are not taken from a private address space.

25

The object of the invention is to provide a mobile station with necessary information of call state control functions, in both cases, located at home and while roaming.

30 This object is solved by a method comprising features of claim 1 and a system comprising features of claim 7. Preferred embodiments are subject of depending claims.

According to a preferred embodiment the address resolution is based on domain name server information exclusively, therefore no other protocols or instances have to be introduced.

- 5 All Call State Control Function (CSCF) instances can be found using similar procedures. The solution requires no changes in the underlying 2nd Generation Access network, especially GSM/UMTS/GPRS network.
- 10 The Cx interface connecting Home Subscriber Server (HSS) and home call state control function must not be used across network boundaries. Preferably, the home call state control function is the contact point within an operator's network for all connections destined to a subscriber of that network
- 15 operator, or a roaming subscriber currently located within that network operator's service area.

There is not required a fixed assignment between mobile station or mobile host as visiting station and H-CSCF, although a fixed assignment would be possible and would speed up address resolution.

There exist flexibility in CSCF selection by using Session Initiation Protocol (SIP) redirects conducted either by the selected CSCF or optionally a dedicated redirect server e.g. load sharing.

A preferred embodiment is described in the following referring to enclosed drawing.

Fig. 1 discloses a communication system providing full home control and a proxy CSCF in the visited network first showing a plurality of devices known as such.

5 Fig. 2 shows a flow chart regarding attach, registration and address resolution procedures in such a visited network.

In present embodiment the local domain name server DNS of the  
10 Visited Network is used to find the call state control function CSCF responsible for the call control, i.e. the proxy CSCF (P-CSCF). As can be gathered from Fig. 2 the mobile station (MS) asks the domain name server DNS for a P-CSCF address in one of the first steps, when asking for a call state  
15 control function CSCF service. The domain name server DNS returns the addresses of possible proxy call state control function P-CSCF instance. The mobile station MS sends an information like „sip:register“ to this proxy call state control function P-CSCF.

20 There are at least four cases where the home call state control function H-CSCF discovery is executed to find the home call state control function H-CSCF of an mobile station MS as follows.

25 If the mobile station MS is attached in the home network, the (proxy) call state function P-CSCF assigned to mobile station MS during PDP Context activation Procedure (PDP: Packet Data Protocol) has to find out it's own home call state control  
30 function H-CSCF.

If the mobile station MS is roaming in a visited 3<sup>rd</sup> Generation network like UMTS, the proxy call state control function P-CSCF assigned to mobile station MS during PDP Context acti-

vation Procedure has to find out the home call state control function H-CSCF of the calling mobile station MS.

If the mobile station MS is roaming in a visited 3<sup>rd</sup> Generation network like UMTS, the proxy call state control function P-CSCF assigned to mobile station MS during PDP Context activation Procedure has to find out it's own home call state control function H-CSCF.

10 During call control (e.g. "sip:invite"), the home call state control function H-CSCF of the calling party has to find out the address of the device providing home call state control function H-CSCF of the called party.

15 To build up a connection with an ordered service at first the MSISDN of the mobile station MS is translated to a domain name e.g. "subscriber.hlr.network.country.xcscf". Thereafter the domain name server DNS is queried and returns the corresponding IP address if found or an error if not found. The 20 letter "x" of ..."xcscf" has different value for different roles of CSCF's.

If the first domain name server query was not successful, domain name server DNS is queried again using "hlr.network.country.xcscf", i.e. without subscriber data.

If the second domain name server query was not successful, domain name server DNS is queried again using "network.country.xcscf", i.e. without subscriber and home location register data. This query must be successful. Otherwise 30 no services can be provided in the home network.

After the IP address is found session initiation protocol (SIP) messages are forwarded to the returned IP address (e.g. "sip:register" or "sip:invite"). In the case that no address could be found, the DNS generates an error message.

5

According to a special embodiment any call state control function CSCF which is selected with domain name server queries can redirect a session initiation protocol (SIP) request to another call state control function CSCF if necessary, for example for load balancing or to optimise the signalling path or whatever. Even more sophisticated, domain name server DNS can return the address of a dedicated session initiation protocol (SIP) redirect server. The proxy call state control server P-CSCF can act as SIP redirect server. This optional new network entity does not process session initiation protocol messages by itself, but redirects them to an appropriate call state control function CSCF. The redirect server makes its decision based on information private to the operator.

If there is a fixed assignment between the mobile station MS and the home call state control function H-CSCF known by the mobile station MS, e.g. the address of the home call state control function H-CSCF can be stored in a SIM card of the mobile station MS, then the discovery of the home call state control function H-CSCF of the calling party as described above can be dropped.

If the mobile station MS is roaming, it can hand over the address of its own home call state control function H-CSCF to the proxy call state control function P-CSCF, e.g. in the "sip:register request" via a "route" parameter.

IP addresses can be taken from a public or local address space. When using a local address space additionally network address translation can be necessary.

- 5 Proxy or home call state control functions acts as call control instances in general which can be found via the domain name server or another device returning their addresses.

Patent claims:

1. Method for address resolution to find call state control function instances in an internet protocol (IP) based network characterised in that a queried domain name server (DNS) returns an IP address corresponding to a requested call control instance address.
- 10 2. Method according to claim 1, wherein the call control instance acts as call state control function (CSCF).
- 15 3. Method according to claim 2, wherein the call state control function (P-CSCF) acts as a border element and controls local services and occasionally necessary resources within a contacted network.
- 20 4. Method according to claim 2 or 3, wherein the selected call state control function (CSCF) acts as a redirect server and redirects a session initiation protocol request to another call state control function (CSCF).
- 25 5. Method according to any preceding claim, wherein the call control instance acts as first contact point within a core network subsystem.
- 30 6. Method according to any preceding claim, wherein an identification number (MSISDN) of a calling station (MS) is translated to a domain name.
7. System for executing a method according to any preceding claim,

said system being a wireless telecommunications network, especially an UMTS, or a wireless local area data network, especially a HiperLAN, having a domain name server (DNS) and a call control instance, said domain name server (DNS) return-  
5 ing an IP address to a requested call control instance address after an corresponding query of a connecting station (MS) ..

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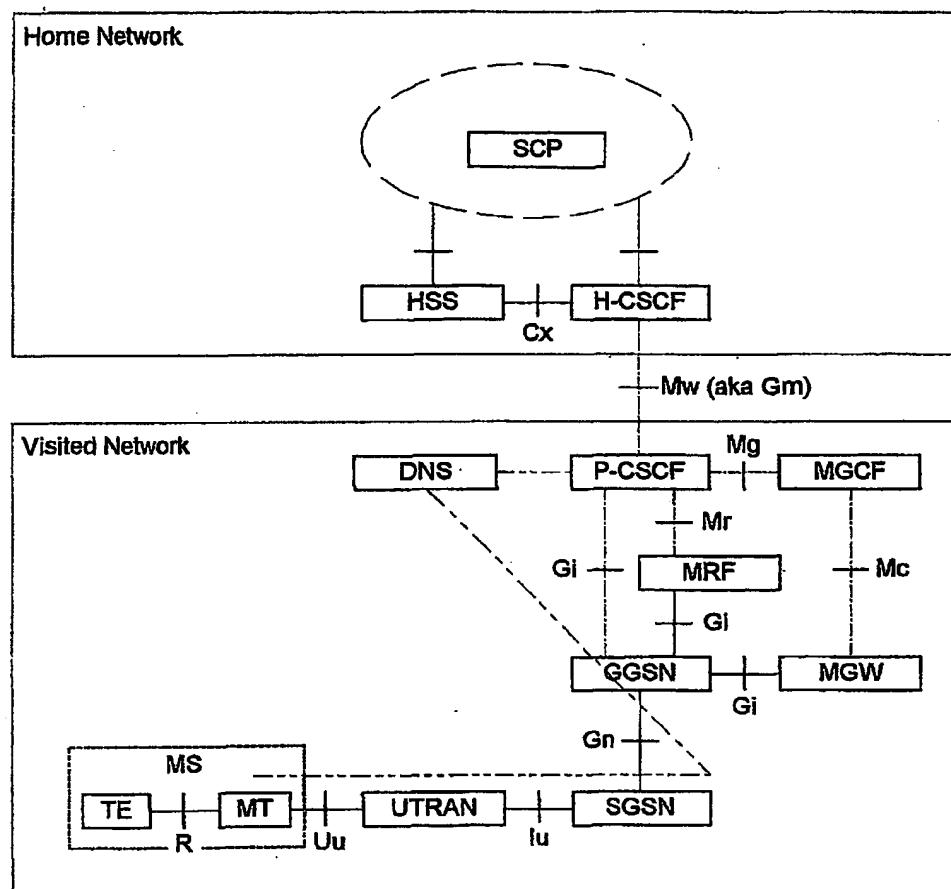


Fig. 1

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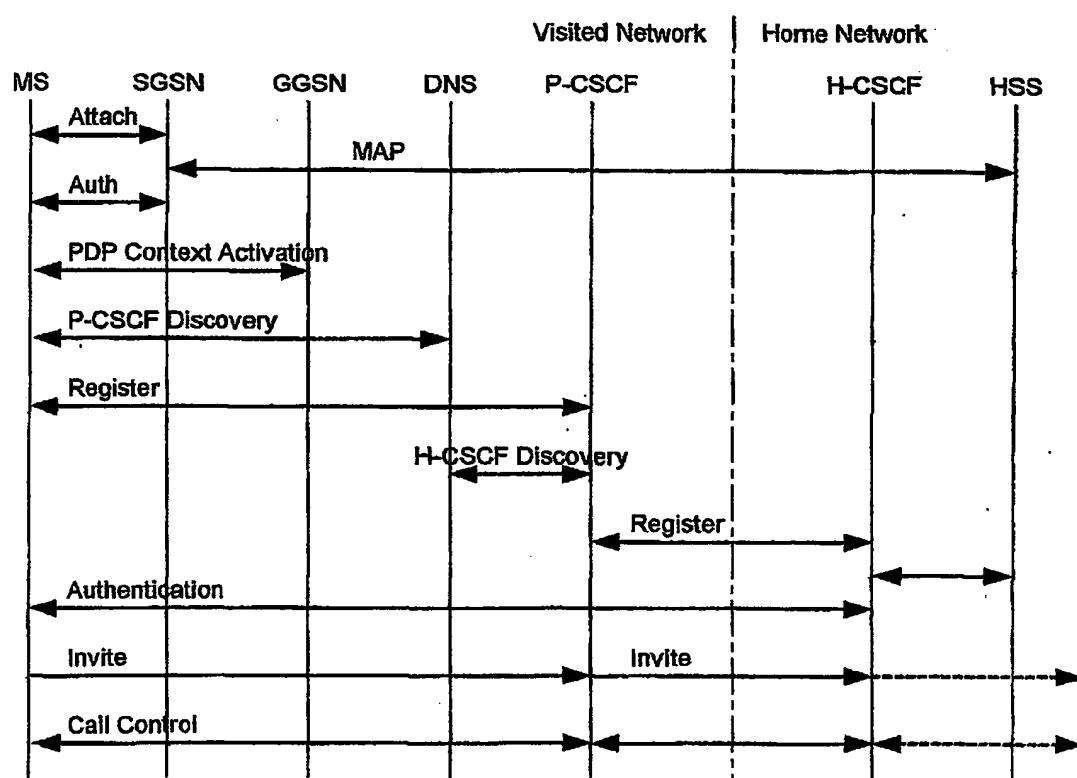


Fig. 2

## INTERNATIONAL SEARCH REPORT

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PCT/EP 01/05682

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 H04L29/12 H04L29/06 H04L12/28

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>NAPOLITANO-RICAGNI: "UMTS all-IP Mobility Management, Call and session control Procedure"  INTERNET-DRAFT, 'Online! XP002149519  internet-Draft  Retrieved from the Internet:  &lt;URL: http://195.103.28.224/ricagni/draft-ricagni-megaco-umts-all-ip-00.pdf&gt;  'retrieved on 2000-10-02!</p>	1,2
A	<p>page 3, line 7 - line 21  page 4, line 5 - line 30  page 9, line 11 - line 16  page 10, line 9 - line 15  page 12, line 7 - line 16  page 17, line 16 - line 24  page 19, line 1 -page 20, line 5  figures 1,4</p> <p>—</p> <p>—/—</p>	3-7

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the International search	Date of mailing of the International search report
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 881 812 A (OKI ELECTRIC IND CO LTD) 2 December 1998 (1998-12-02) abstract column 2, line 14 - line 29 column 5, line 19 - line 28 column 7, line 23 -column 8, line 9 figure 6 ---	1,2
A	WO 99 38303 A (NORTHERN TELECOM LTD ;SMITH JEFFREY G (US); BROTHERS JOHN DAVID WE) 29 July 1999 (1999-07-29) page 2, line 15 -page 3, line 19 page 5, line 1 - line 17 page 9, line 30 -page 10, line 4 ---	1-7
A	ANQUETIL L -P ET AL: "MEDIA GATEWAY CONTROL PROTOCOL AND VOICE OVER IP GATEWAYS. MGCP AND VOIP GATEWAYS WILL OFFER SEAMLESS INTERWORKING OF NEW VOIP NETWORKS WITH TODAY'S TELEPHONE NETWORKS" ELECTRICAL COMMUNICATION, ALCATEL. BRUSSELS, BE, 1 April 1999 (1999-04-01), pages 151-157, XP000830045 ISSN: 0013-4252 page 153, left-hand column, line 7 -page 154, middle column, line 37 ---	1-7
A	WO 99 11042 A (KONINKL PHILIPS ELECTRONICS NV ;PHILIPS SVENSKA AB (SE)) 4 March 1999 (1999-03-04) abstract page 1, line 12 - line 22 ---	7

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report	Publication date		Patent family member(s)	Publication date
EP 0881812	A 02-12-1998	JP CA CN EP SG	10327195 A 2238514 A1 1200610 A 0881812 A2 65071 A1	08-12-1998 26-11-1998 02-12-1998 02-12-1998 25-05-1999
WO 9938303	A 29-07-1999	AU EP WO	2461299 A 1050146 A1 9938303 A1	09-08-1999 08-11-2000 29-07-1999
WO 9911042	A 04-03-1999	EP WO JP US	0940026 A1 9911042 A1 2001505751 T 6178512 B1	08-09-1999 04-03-1999 24-04-2001 23-01-2001

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